



## Scalable Windows Storage Server File Serving Clusters Using Melio File System and DFS



### Step-by-step Configuration Guide


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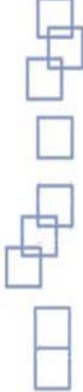


## Scalable File Serving Clusters Using Windows Storage Server


Microsoft Windows Storage Server 2003 is frequently deployed as a file serving solution in small or midsize applications. I/O performance is determined by the disk drive configuration and the server hardware, typically an industry standard Intel-or AMD-based server. Many customers have viewed Windows Storage Server as an excellent small NAS solution, but have moved to larger, proprietary file server appliances when their needs expand beyond the capacity of a single Window Storage Server. This approach typically adds considerable expense and the complexity of introducing a new proprietary island system to manage.




Using Melio file system, multiple Windows Storage Server 2003 file servers can be clustered into a common file system on external SAN storage. All Storage Servers have concurrent read and write access to the shared storage using Sanbolic's clustered file system, so a request for a specific file can be processed by any of the Storage Servers accessing the shared volume on the SAN.



Additional servers and additional storage arrays can be added dynamically to the cluster to expand I/O performance or storage capacity without I/O interruption while client systems continue to access data. I/O performance scales linearly as additional Windows Storage Server 2003 machines are added to the cluster. Clusters of up to 64 machines have been demonstrated, and larger clusters are possible. A large cluster can provide aggregate throughput of multiple gigabytes per second when there is sufficient performance in the backend SAN. Melio FS is a 64 bit file system, which can support very large volume and file system sizes. The 2 terabyte limit is a thing of the past.



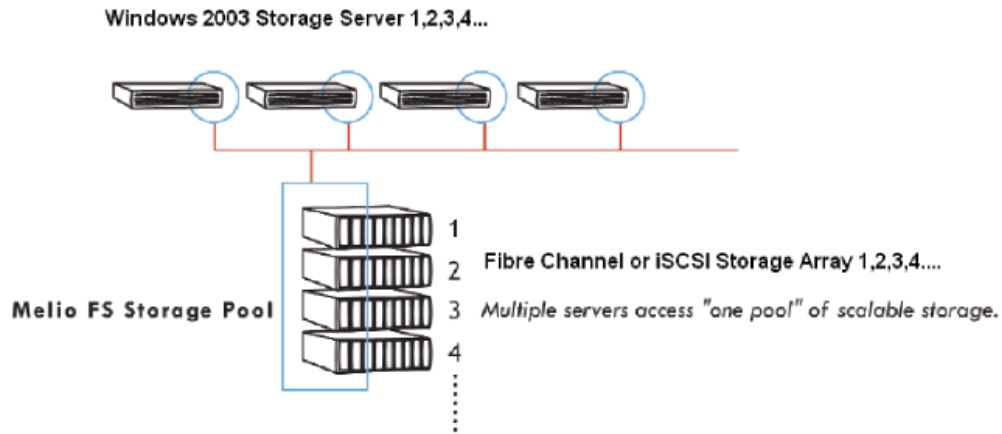
Clusters of Windows Storage Servers (available from many different OEMs on industry standard hardware) using Melio file system and backend SAN storage provide a very cost effective file serving solution that allows customers to add capacity as needed and continue to use their Windows tools to manage their file serving system.



A scalable file serving cluster can be quickly and easily configured using off-the-shelf Windows Storage Servers with fibre channel or iSCSI connections to shared external storage, Microsoft DFS, and Sanbolic's Melio file system and LaScala volume manager.



## Scalable File Systems using External Storage



## Using DFS Namespaces with Scalable File Serving Clusters



Microsoft DFS can be used to fail over, load balance, and distribute CIFS file calls among the Storage Servers and provide a single network address to clients on the network. Alternatively, a hardware load balancer can be used to balance both NFS and CIFS network calls in environments where multiple client operating systems are used. Since DFS is a standard component of the Microsoft Windows Server 2003 license, this paper will describe the configuration of DFS for a scalable file serving system using two Storage Servers sharing access to Melio-formatted volume on an external SAN.




Although DFS is used to provide a single "namespace," It is important to note that in Storage Server clusters using Melio file system, a client can access a **common volume** on a SAN through **any** of the Storage Servers in the cluster. Hence, I/O performance available from the volume can be much greater than the throughput of a single Storage Server, and will depend on the number of Storage Servers in the cluster and the performance of the SAN storage hardware. It also means that if any of Storage Servers were to fail, the data on the common volume is still available to clients through any of the remaining Storage Servers. The DFS namespace is used primarily so that the clients see the common volume as a single share, even though it can be accessed through any of the Storage Servers in the cluster.

By implementing DFS and Melio FS on the Windows Storage Servers, both I/O scalability and fault-tolerance/high availability for the network clients will be achieved.


### Example of a Small File Serving Cluster Configured with DFS

This example will describe two servers running Windows Storage Server 2003 R2 and Melio FS, which are named StorageServer2 and StorageServer3. A shared LUN is presented to each Storage Server from the



storage array over a fibre channel or iSCSI fabric. The LUN is then managed using Sanbolic's LaScala Volume Manager and formatted with Melio File System. Both Storage Servers can then read and write to the shared volume concurrently over fibre channel or iSCSI. The clients in this example are running Windows XP and are connected to the Storage Servers using a LAN.

This example uses two Storage Servers for simplicity of describing the configuration. A cluster can easily be configured to include several dozen servers.



This paper does not describe in detail the installation of Melio and LaScala on the Storage Servers, or the process of configuring a shared volume.




However, the installation and configuration takes only a few minutes once the hardware is set up. A detailed description can be found at:



[http://www.sanbolic.com/pdfs/LaScala\\_manual.pdf](http://www.sanbolic.com/pdfs/LaScala_manual.pdf)

[http://www.sanbolic.com/pdfs/MelioFS\\_Installation\\_Guide.pdf](http://www.sanbolic.com/pdfs/MelioFS_Installation_Guide.pdf)

The provisioning of a shared LUN on the SAN for the Melio volume will depend on the type of storage being used. Please refer to your storage vendor's documentation.



## Requirements for Configuring DFS in a Scalable Storage Server Cluster:

- The Namespace servers should be running Windows Storage Server 2003 R2 or Windows Server 2003 R2.
- Melio File System and LaScala volume manager are installed on each Storage Server
- A shared LUN on the external shared storage is formatted with Melio and mounted on the Namespace servers

The Distributed File System service must be running on all DFS root servers and domain controllers so that DFS can work properly. This service depends on the following services:

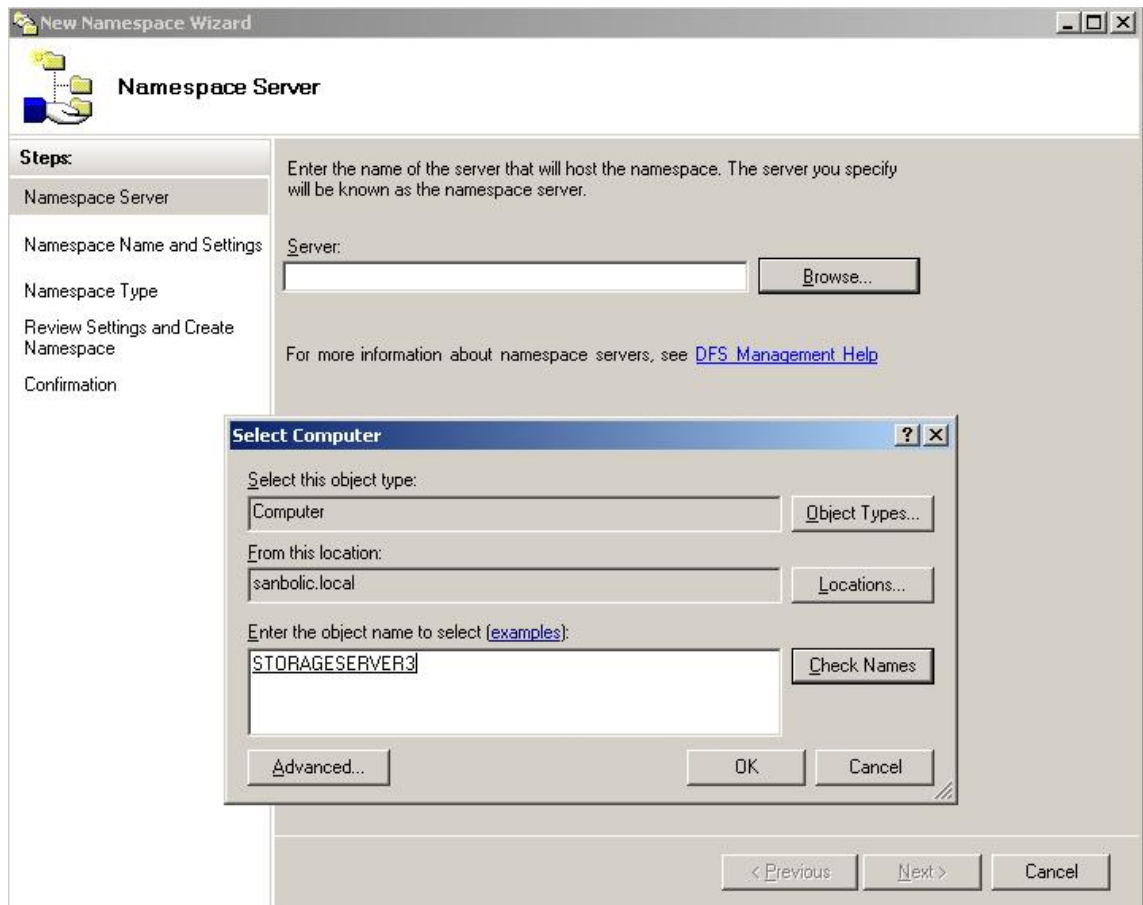
- The Server service, Workstation service, and Security Accounts Manager (SAM) service is running on DFS root servers.
- The Distributed File System service also requires an NTFS volume to store the physical components of DFS on root servers.
- The Server service and Workstation service is running on domain controllers
- The clients should be running Windows XP and above

## Steps for Configuring DFS

Create a Melio-formatted shared volume on the SAN which is mounted as Drive X. A detailed description of this process is described in the Melio and LaScala manuals, accessible at the links above.

From the Windows Storage Server Management console expand *DFS Management*. Right-click the Namespaces node and select New Namespace. The *New Namespace Wizard* starts and requests that the server that will host the Namespace be specified. In this example it will be StorageServer3. After choosing the server the wizard will prompt to start the DFS service if it is not already running.

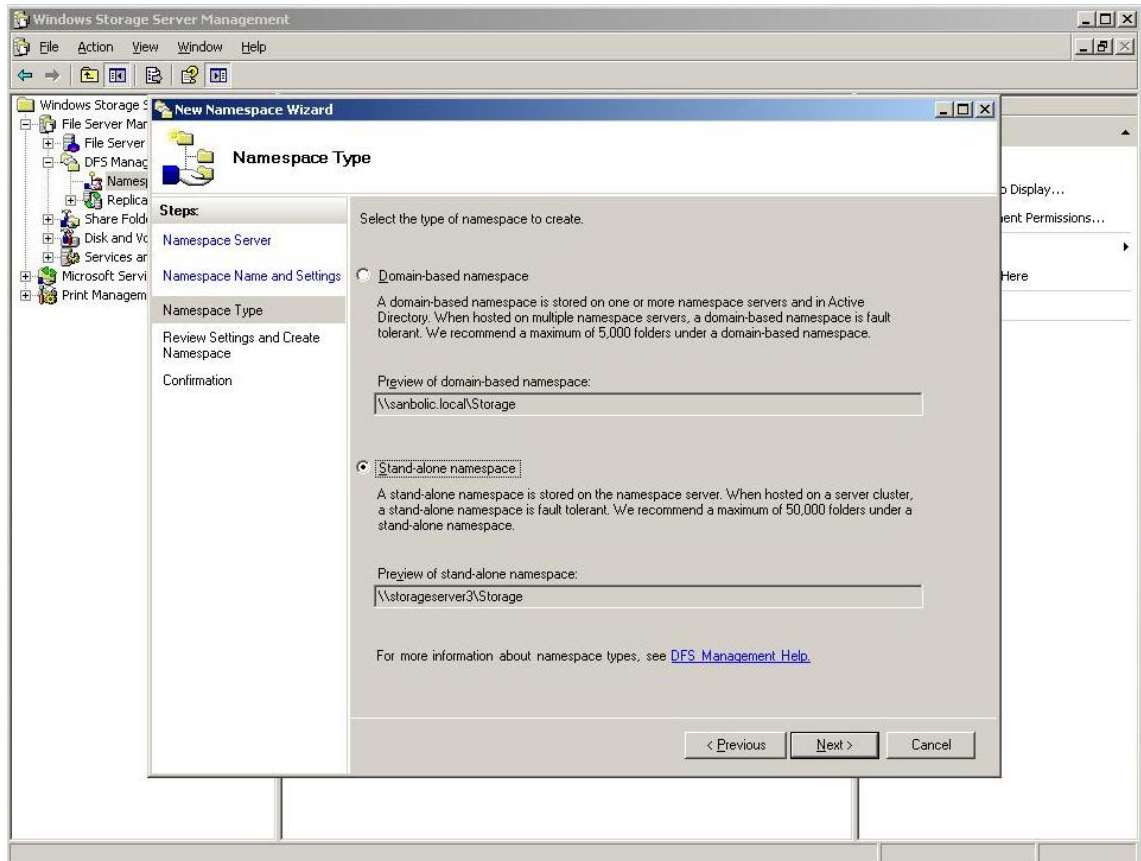
Next, specify a name for the Namespace. In this example the name is "Storage". The wizard automatically creates a "Storage" share on the target server.



Clicking "Next" brings up the *Namespace Type* page of the wizard, where one can choose a domain-based or stand alone namespace. The domain-based namespaces are stored on both the namespace server and in the Active Directory. This makes them easier to search for in a domain based

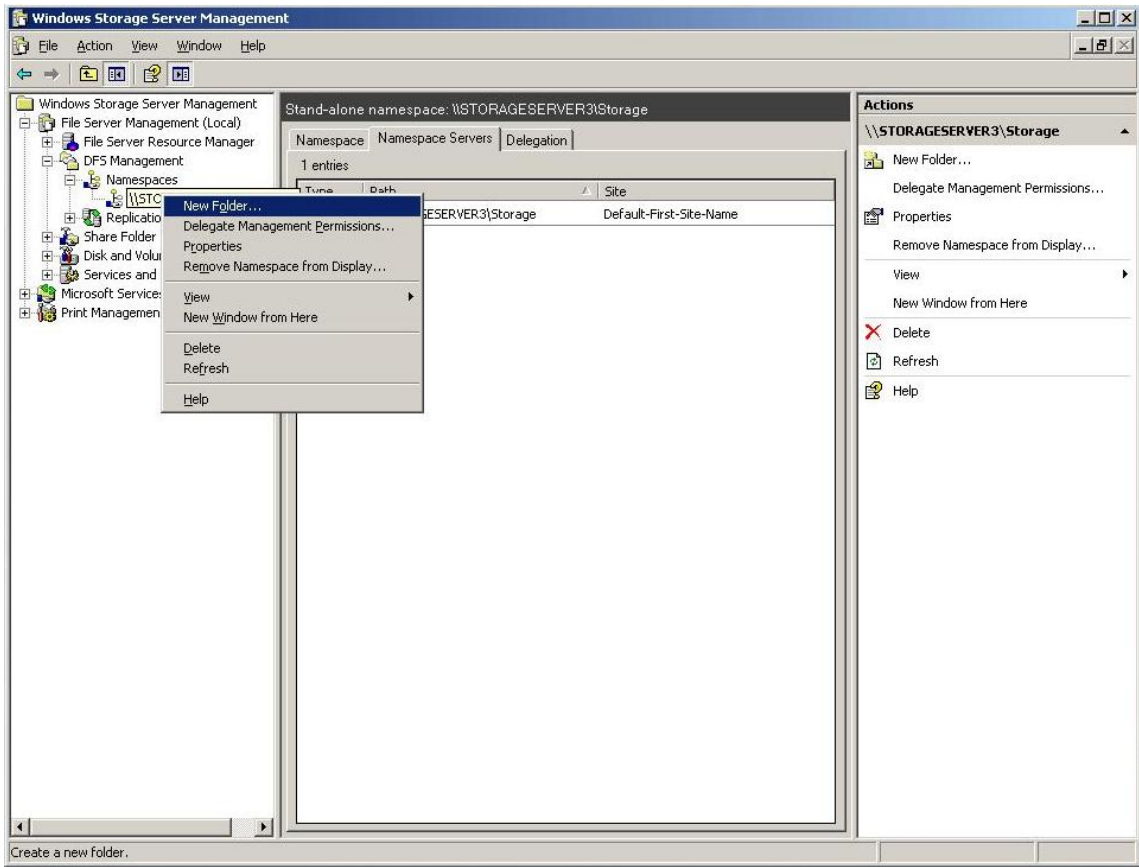
networking environment and can be hosted on more than one namespace servers to provide fault tolerance. Large clustered Storage Server environments should typically be configured using a domain-based namespace. The standalone namespaces are stored only on namespace servers and not within the Active Directory.

For simplicity in this example, standalone namespace is used. Clicking Next and then Create will create a new namespace "Storage".

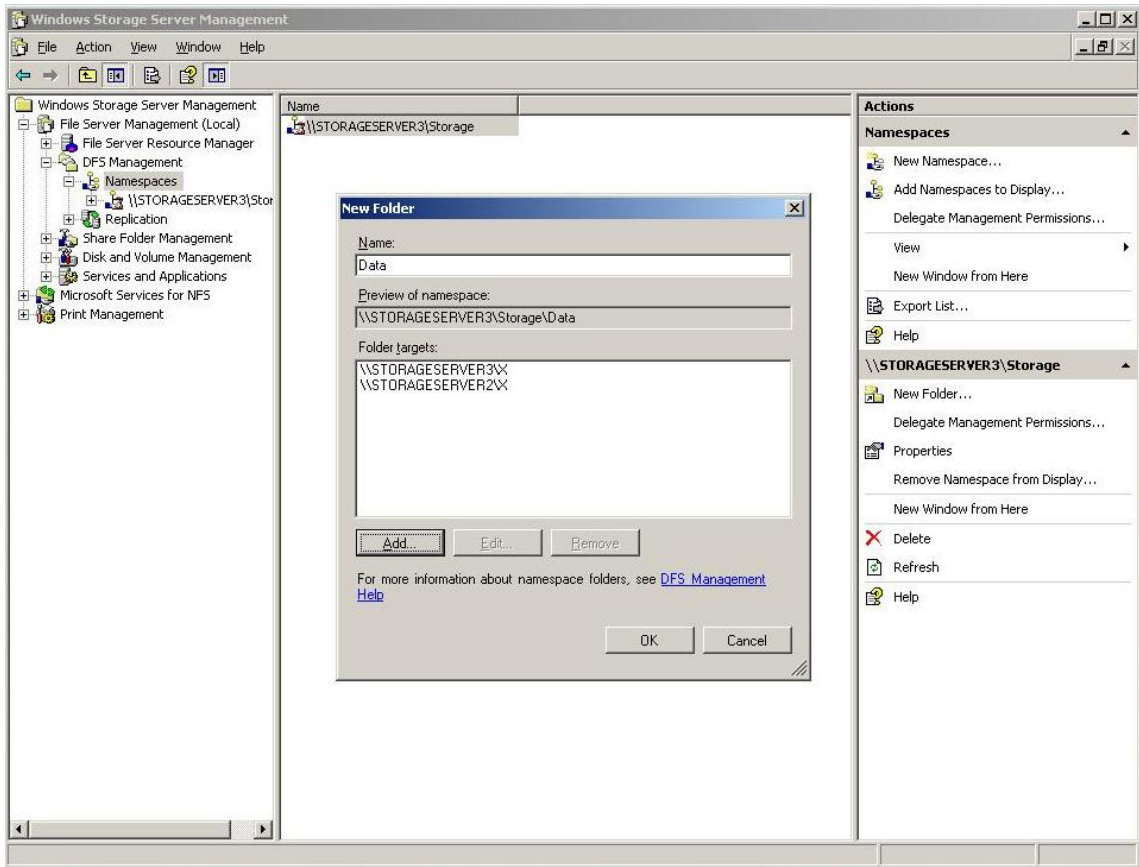


The new Namespace will be rooted in a shared folder on the Windows system drive under the \DFSRoots\Storage. By default the wizard gives *Everyone* read permissions in the root folder.

The next step is to create folder in the namespace. To do this, select *New Folder* from the action plane or right-click the namespace and select *New Folder*.

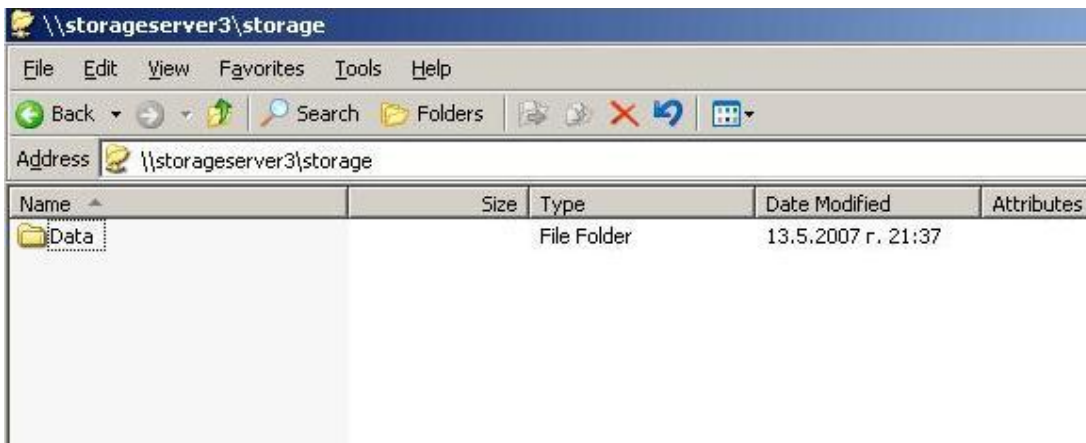


The new folder is given the name "Data". Targets can then be added to the folder. In this case, the targets are the Melio FS formatted volume shared between the two Storage Servers. The path to the folder through each Storage Server is added as a target. If additional Storage Servers were added to the cluster, the path to the shared folder through the additional Storage Server would be added as a target as well.



Folders can also be added without targets to help organize the information in the storage. Clicking OK will create the folder.

To access the resources in the new namespace, log on as ordinary user to a computer running Windows XP. Click the Start button, click Run, and type: `\\StorageServer3\Storage` and press Enter or click OK. This opens in the Explorer the root of the Namespace, providing access to the folder named "Data" and the information stored there.





## Summary

The modular scalability of file serving systems utilizing Sanbolic's Melio clustered file system and Microsoft Windows Storage Server 2003 R2 provides customers with the flexibility to use external storage to grow storage capacity, while using industry standard server hardware to modularly grow I/O performance. Both storage capacity and I/O performance can be expanded dynamically as data continues to be accessed.

Customers are free to use their preferred hardware vendor, and can rapidly incorporate performance enhancements in processors, disk drives and network. Microsoft sells Windows Storage Server 2003 R2 through selected OEM hardware partners. The result is a flexible, fully featured, highly available storage system without introducing a new proprietary and expensive hardware-based solution.

This article described how to configure Windows Storage Server 2003 R2 and DFS Namespaces to provide client computers with network access to a shared volume formatted with the Melio FS. The namespace offers a simple way to redirect users to other servers that connect to the shared volume(s) on the external array, providing increased file serving capacity to the data by utilizing multiple paths to the data, while providing a higher level of data availability because of the inherent redundancy in the system.

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